XX.—*On* Arvicola indica, *Gray, and its relations to the Sub-Genus* Nesokia, *with a description of the species of* Nesokia.—*By* J. ANDERSON, M. D., *Superintendent of the Indian Museum, and Professor of Comparative Anatomy, Medical College.*

(Read 4th Dec. 1878.)

(With Plates XIII and XIV.)

In Gray and Hardwicke's Illustrations of Indian Zoology there is a representation of a rodent,* "The Indian Field-Mouse," *Arvicola indica*, Gray, bearing the date 1st May, 1829. This drawing is unaccompanied by any information regarding the locality from whence the animal was obtained. It represents a rat with a short bluff head; with moderately-sized, semi-nude ears; sparsely clad feet with rather long claws, and a naked tail shorter than the length of the body and head. The eye is figured large. The general colour is a pale sandy brown, with interspersed longer hairs.

In the Proceedings of the Zoological Society for 1835, p. 108, it is recorded that Dr. Gray on exhibiting some rats and mice collected by Mr., now Sir Walter, Elliot, in the Southern Mahratta country, took occasion to point out that the so-called *Arvicola indica* was really a true *Mus*. In 1837† Dr. Gray in referring to the Genus *Mus*, as understood by him, stated that "the *Mus giganteus*, Hardwicke, may be regarded as the type, to which may be added the two following new Indian species which have the tail shorter than the body and the fur with scattered bristles," and these species were *Mus rufescens*, Gray, (House-rat), and *Mus kok*. The latter he considered to be identical with *Arvicola indica*. Dr. Gray, holding this view regarding the identity of the animal figured in the Ill. Ind. Zool. with that of the rat sent by Elliot from Madras, under the Canarese name of *Kok*, re-named it, adopting the native name, *kok*, for the species. The *Mus kok*, afterwards described by Elliot as *Mus providens*, appears to me, however, to be distinct from the animal originally figured as *A. indica*.

In the same contribution, Dr. Gray described a rodent with "the cutting teeth, large, smooth, yellow and flat in front" under the name of *Mus hardwickii*. He compared it to *Mus kok*, that is, to the Madras rat which, he stated, it very much resembled, "but the skull is much wider and stronger and rather larger, and the cutting teeth are nearly twice as wide and are flat in front. The grinders are very little larger than those of that species."

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* Vol. I, Plate XI, Mamm. 1832.

† Mag. Nat. Hist. (Charlesworth) Vol. I, 1837, p. 585.

In 1842,[*] Dr. Gray, selecting *Mus hardwickii* as his type, described the genus *Nesokia*, characterizing it thus, "cutting teeth very large, flat in front and smooth; grinders 3·3; front upper large with three cross ridges; the middle oblong, and the hinder much narrowed behind, each with two cross ridges; the front lower grinder larger, narrowed in front with three cross ridges; hinder each with two ridges, the hindermost smallest, rather narrowed behind: tail short, thick, with whorls of scales and scattered bristles: toes 4—5, moderate, the three middle sub-equal, long, the outer moderate: claws small, compressed: front thumb tubercular, with a rudimentary claw: ears moderate, naked." "This genus," Dr. Gray states, "is easily known from the rats *(Mus)* by the large size of the cutting teeth and the shortness of the tail: it appears," he continues, "to be intermediate between the Rats and *Rhizomys*."

In 1839,[†] Sir Walter Elliot described the afore-mentioned rat from Southern India under the name of *Mus (Neotoma) providens*, identifying it with the *Mus indicus*, Geoff. and the *Arvicola indica*, Gray, mentioning its Canarese name *Kok* or *Koku*, but his identification of it with *M. indicus* Geoff. was erroneous, as *Mus providens* is undoubtedly a *Nesokia*. Prof. A. Milne-Edwards, who has kindly examined for me the type specimen of *M. indicus*, Geoff. in the Paris Museum, informs me that it is very nearly allied to *Mus decumanus*, and that, although it is a little smaller, its teeth have the same conformation; and he further observes that *Mus indicus* is perfectly different from the animal figured by Peters under the name of *Spalacomys indicus*. *Mus providens*, however, has a skull like that of *S. indicus*, as I have satisfied myself by the examination of the skulls of two of Sir Walter Elliot's specimens.

Sir W. Elliot, in considering *Mus providens* as identical with *Arvicola indica*, Gray, lends the weight of his authority to the view that I have been led to adopt regarding *Arvicola indica*, because there can be no doubt that they both belong to one sub-generic type of *Mus*.

On referring to the list of Mammalia in the British Museum, published in 1848, three specimens of a rat are mentioned under the name of *Mus kok*[‡] from Madras, and presented to the British Museum by Sir W. Elliot, and in the Introduction to his List of Mammalia[§] 1843, Dr. Gray states that the *Mus kok* and some other species of rats (*Mus rufescens*, &c.) described in the Magazine[||] of Natural History, 1837, were founded on specimens sent by Sir Walter Elliot, and that they were authentic specimens of the species described by Elliot in the Madras Journal of Literature and Science.* There can therefore be no doubt of the identity of *Mus kok* with *Mus providens*, and that the types, as stated in the 'List of Mammalia,' on the authority of Elliot, were from cultivated plains in the Madras Presidency, and from Madras itself. The figure of *Arvicola indica*, fortunately bearing the date, 1st May 1829, renders it impossible that any of Elliot's specimens could have contributed the type of that species, and, moreover, in the Proceedings of the Zoological Society of 1835, it is stated that it was figured from General Hardwicke's drawings.

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[*] Ann. and Mag. Nat. Hist., Vol. X, 1842, p. 264.

[†] Madr. Journ. Lit. and Sc., Vol. X, 1839, p. 209.

[‡] *l. c.*, p. 110.

[§] *Op. cit.*, 1843, p. vii.

[||] *l. c.*

In the 'List of Mammalia,' there is no specimen under *M. kok*, of which *Arvicola indica* was regarded by Dr. Gray as a synonym, that could have formed the type of the latter, as all the specimens of *M. kok* that have been mentioned were, with one exception, received from Sir W. Elliot. The exception is described as (*e*) "a small rat with a very long tail: India: from Dr. Smut's Collection." A very long tail would seem to be sufficient evidence that this was neither *M. kok* nor *Arvicola indica.* On again turning to the 'List of Mammalia,' we find that the type of *Nesokia hardwickii* was presented by General Hardwicke, and in connection with this it is noteworthy that animals from the North-West Provinces of India corresponding to the description of that species are remarkably like the drawing of *Arvicola indica.* Moreover, Blyth states that there is no rat in Bengal, nor apparently in Madras, corresponding to that figure, and by extensive research, I can confirm this statement.

In the Catalogue of the Specimens and Drawings of Mammalia and Birds of Nepal and Tibet, presented by B. H. Hodgson to the British Museum (1846), the *Kok, M. providens,* is assigned to *Nesokia,* a course which Blyth himself followed in his Memoir on the Rats and Mice of India and in his Catalogue of Mammals.

In 1842, Sir Walter Elliot presented two stuffed specimens of *Mus providens* = *M. kok*, Gray, to the Museum of the Asiatic Society of Bengal and these specimens still exist in the Indian Museum. They apparently belong to the variety found in the red soil, and which Elliot says is much redder than the common *Koku* of the black land, and they are quite distinct from *M. (N.) hardwickii.*

On a review of these circumstances, I am disposed to make the suggestion that the rat figured as *Arvicola indica*, and which Gray considered to be the *Mus indicus* of Geoffroy, is in reality the rat described by him, first under the name of *Mus hardwickii*, and afterwards as *Nesokia hardwickii ;* and in connection with this view of the question, it is important to bear in mind that the figure of *Arvicola indica* was received from

* *l. c.*

General Hardwicke who afterwards, in presenting to the British Museum the type of Gray's *Mus (Nesokia) hardwickii*, presented a rat agreeing with the figure of *Arvicola indica.* The type of *Mus indicus* with which Gray believed his *Arvicola indica* to be specifically identical was from Pondicherry, and as has already been stated, it is a true rat allied to *M. decumanus*, and perfectly distinct from the animal figured under the name of *A. indica*, but, moreover, no rat has been obtained at Pondicherry at all corresponding specifically to the *Mus (Nesokia) hardwickii* with which the figure of *Arvicola indica* agrees.

The specimens of *Mus providens* in the Calcutta Museum are distinguished from *Mus (Nesokia) hardwickii* by their much narrower incisors, smaller molars, and by a long but narrow anterior palatine foramen, an opening which is very short in *Mus (Nesokia) hardwickii*, as is seen in Peters' characteristic figure of the so-called *Spalacomys indicus*,* but the form of the skull is the same, both differing in the same respects from *Mus.* I have had the Madras rat alive† and have observed that it has the deep and rather short muzzle of *Nesokia*, with incisors broader than those of ordinary rats, and with the molars, when worn down, having the general characters of *Nesokia.* These rats, coming as they do from Southern India, agree externally with the types of *M. providens*, and have similar short *Nesokian* skulls.

In Lower Bengal, there is a burrowing rat, a great pest in gardens, in which it constructs numerous tortuous passages, some comparatively superficial, and others at times very deep, and throws up heaps resembling mole hills. It is closely allied to *Mus providens*, but differs from it in its somewhat greater size, and in other slight details, afterwards to be noticed. This is the rat which Blyth incorrectly identified with *Mus indicus*, Geoff., and with which he also wrongly identified *Arvicola indica*, *Mus huttoni*, Blyth, *M. rattoides*, Hodgson, *Mus pyctoris*, Hodgson, and *Mus dubius*, Kelaart, but which is perfectly distinct from *Mus (Nesokia) hardwickii* which also differs from *M. huttoni.* It appears probable that this is the rat also figured in the Ill. Ind. Zool. Vol. II, pl. 21, under the name of *Arvicola bengalensis*, but which was never described. This being the case, the Bengal form must be named, whilst *Mus (N.) hardwickii* will stand for the rat originally described as *Arvicola indica*, and afterwards as *Nesokia hardwickii ;* the original of the figure of *A. indica* being probably the type itself of *Mus hardwickii*, whereas *M. (N.) providens* will stand for the Southern form first described by Gray under the barbarous name of *M. kok.* In the Indian Museum, there are many rats in alcohol from Fatehgarh, presented by the late Mr. Andrew Anderson, which yield skulls the exact counterpart of the skull figured by Peters as *Spalacomys indicus*, and these rats agree with the figure of *A. indica*, and with the description of *Nesokia hardwickii.* Hodgson described, in 1846, a rat from Nepal which he called *Mus hydrophilus** and which Gray first regarded as an *Arvicola*, and afterwards as a *Nesokia.* He described it as characterised by its small ears, hardly above one-third the length of the head, also by its short tail "and by its fine and short pelage: the head he described as larger and the muzzle thicker than in the common land rats; 'above dusky brown; below and the limbs nearly white. Long piles inconspicuous. Snout to vent $3\frac{1}{2}$ inches; tail $2\frac{3}{4}$; head $1\frac{1}{4}$; ears $\frac{9}{16}$; palm $\frac{1}{2}$; planta $\frac{7}{8}$.' These characters would seem to indicate a rat allied to the so-called *Nesokia* or *Spalacomys*, Peters, but I hesitate to pronounce any decided opinion on the species. In connection with the name of *hydrophilus* given by Hodgson to this rat, I have observed that the common *Nesokia* of Lower Bengal, which I propose to name *Mus (N.) blythianus* after Blyth, who did so much to forward the progress of Natural History in India and to enlarge our knowledge of this group, manifests a remarkable capacity, for a rat of its type, to take to water, when hard-pressed. Its burrows are frequently constructed on the banks of tanks in Lower Bengal, and when the rats are being dug out, they will freely take to the water, if that is their only way of escape, and swim considerable distances. To test this aquatic power, I had two rats placed in a large wire bird-cage, and the cage partially submerged. If the rats, when in those circumstances, were much annoyed, they immediately dived to the bottom of the cage, where they could be observed running about under water. I also had them removed from the cage, and let loose in the large sheet of water in the Zoological Gardens, between the two iron bridges. When let loose at the bank, and an attempt was made to catch them, they immediately dived, and the stronger of the two did not appear at the surface for some time, when it was observed at a considerable distance from the bank, making for the opposite side.

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* Abhand. der K. Akad. Wissensch. zu Berlin, 1840, p. 143, Taf. II, fig. 1.

† I may take the opportunity to record here that males and females of this rat escaped from confinement in the Calcutta Museum.

I have already referred to the name given by Elliot to the allied form from Madras, viz., *M. providens.* He records of it that it stores up large quantities of grain during harvest. The natives of Bengal ascribe a similar habit to *M.* (*N.*) *blythianus*, and it has been stated to me that sometimes considerable quantities of grain may be found in a burrow, and that the natives being aware of this habit make raids on these murine granaries.

With reference to the characters of the genus *Nesokia*, Gray, the examination of a large series of skulls of *M. hardwickii* and of the other species shows that the dental features selected by Gray are essentially those of worn teeth, and that they do not contain the characters of the dentition as seen in the teeth before they are worn. In the latter condition, each of the three laminæ of the first upper molar presents a large central cusp, and a much smaller or even minute cusp on either of its sides, resulting as it were from the sinuous characters of each lamina of the tooth. In true mice and ordinary rats, the laminæ are transversely more sinuous and smaller, whereas in *Nesokia* they are large and transverse without any marked sinuosity, in the more typical forms. In the second upper molar, there are only two laminæ, the first being abortive and only represented by a small isolated cusp attached to the anterior face of the inner cusp or fold of the first of the two laminæ, which is exactly the same arrangement as in *Mus*. The last molar, except in having its laminæ more regularly transverse than in *Mus*, resembles the same tooth in this latter genus. In the lower jaw, there is the same regularly transverse character in the larger laminæ as compared with *Mus*, but all the cusps are the same. In the large rats of the type of *M. giganteus*, Hardwicke, the teeth conform more to the type characteristic of the ordinary rats and mice, the laminæ, however, being relatively larger than in *Mus* and less sinuous, but taking the dentition as a whole, in connection with the form of the skull, these large rats are more closely allied to *Nesokia* than to the true rats, an opinion which was first held by Sir Walter Elliot.*

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* Ann. and Mag. Nat. Hist. Vol. XV, 1845, p. 267; Cat. Sp. and Draw. Mamm. &c. Hodgson, Nepal, Coll. Brit. Museum, 1846, p. 19; *l. c.* 1863, new ed., p. 10.

The incisor teeth of a *Nesokia* are always broader than those of an ordinary rat, and in this respect are more chisel-shaped, but the incisor teeth of the large rats such as *M. giganteus* are also proportionally broader than those of ordinary rats.

In the adult animal, such as that figured by Prof. Peters, the laminæ are very regularly transversely oblong without any trace of such cusps as those I have described; and in old individuals of the larger rats, such as *M. giganteus*, the teeth I have observed to be worn down, much in the same way as in the so-called *Nesokia* = *Spalacomys*. Considering these facts, it does not appear that the genus *Nesokia* has any ground to recognition on characters derived from the dentition. The points in which the skulls of rats referable to the type of *M. (Nesokia) hardwickii*, Gray, (*Spalacomys indica*, Peters,) differ from those of the ordinary rats and mice are, on the other hand, much more pronounced than any difference in their dentition. The skull of *Nesokia* is a much broader and shorter skull with a short stout muzzle and expanded zygomata. The brain case is much shorter and broader than that of any member of the genus *Mus*. The temporo-parietal ridges also are proportionally nearer each other than in *Mus*, and the upper surface of the parietals is more flattened. The anterior palatine foramina are much more closed than in ordinary rats and mice, and in some of the more typical *Nesokiæ*, such as *M. (N.) hardwickii*, they are almost closed. There is also this further difference, that the palate of *Mus-Nesokia* contracts more anteriorly than in *Mus*, and is always proportionally narrower, with a much shorter edentulous interspace behind the last molar than in *Mus*. In the larger rats, such as *M. giganteus*, the posterior portion of the palate, in this respect, corresponds to *Mus-Nesokia*, and the features of the palate generally are more *Mus-Nesokian*, than those of true *Mus*. The palate also of *Mus-Nesokia* is marked by two somewhat pronounced longitudinal furrows which are the backward prolongations of the anterior palatine foramina. These grooves, near their hinder extremities, have the posterior palatine foramina lying in their course, and beyond them they are prolonged over the posterior margin of the palatines where they nearly constitute a closed canal by the inward projection of the inner palatine border of the maxilla and the somewhat thickened and anteriorly recurved posterior margin of the palatines. This arrangement is seen to occur only in a very feeble degree in ordinary rats and mice which, however, have not, as a rule, any thickening of the hinder margin of the palatines. Like the majority of thoroughly burrowing rodents, the tympanics are relatively much larger than in the ordinary rats. The large rats (*M. giganteus*) have the palatine features and the tympanics of *Mus-Nesokia*. These giant rats have rather more elongated skulls than the more typical Nesokians and, in this respect, they serve to connect the latter with the generality of mice and rats, but in their other features they more resemble *Mus-Nesokia* than *Mus*. I would therefore regard them as constituting a section of the sub-genus *Nesokia*. This view was first put forward by Sir Walter Elliot, so long ago as 1839, and Blyth agreed with him in regarding the affinities manifested by the great bandicoot rats as thoroughly *Nesokian*, and in the propriety of separating all of these *Nesokian* species from the typical forms of mice.

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* Madr. Journ. Lit. and Sc., Vol. X, p. 209. Sir W. Elliot erroneously regarded *M. providens* and *M. giganteus* as belonging to the genus *Neotoma*.

After a careful consideration of the characters which these various species display, it appears that this sub-genus of *Mus* may be conveniently divided into three sections ; 1st, one section containing such forms as *Mus* (*Nesokia*) *hardwickii*, *M. (N.) huttoni*, *M. (N.) scullyi*, the more typical species of *Nesokia*, all characterised by broad incisors regularly laminated, large molars and small anterior palatine foramina, with tails considerably shorter than the body ; and the females possessing only 4 pairs of mammary teats, two inguinal, one axillary and one pectoral : 2nd, another section comprising *M.* (*N.*) *providens*, *M.* (*N.*) *blythianus* (*n. s.*) and *M.* (*N.*) *barclayanus* (*n. s.*), distinguished by somewhat narrower incisors, smaller and less regularly tranversely laminated molars, more open anterior palatine foramina and longer tails ; with the females possessing as many as even 7 to 9 pairs of mammary teats*: and, lastly, a third division containing *M.* (*N.*) *giganteus* and *M.* (*N.*) *elliotanus*, (*n.s.*) the so-called bandicoot rats, with longer skulls, broad incisors, with molars of the type of the second section, but proportionally somewhat larger with less wavy laminæ, longer anterior palatine foramina and tails nearly equalling the length of the body and head. I have largely collected rats for the Indian Museum from all parts of India, and out of the materials brought together I am enabled to determine the following species belonging to the sub-genus *Nesokia.*

1st Section.

MUS. (NESOKIA) HARDWICKII, Gray.

? *Arvicola indica*, Gray, Gray and Hardw., Ill. Ind. Zool., Vol. I, 1832, Pl. XI.

Mus. hardwickii, Gray, Mag. Nat. Hist. (Charlesworth), Vol. 1, 1837, p. 585.

Nesokia hardwickii, Gray, Ann. and Mag. Nat. Hist., Vol. X, 1842, p. 265, List Mamm. of 1843, p. 113; Jerdon, Mamm. Ind. 1867, p. 190.

? *Mus hydrophilus*, Hodgson, Ann. and Mag. Nat. Hist., Vol. XV, 1843, p. 267.

? *Mus pyctoris*, Hodgson, Ann. and Mag. Nat. Hist., Vol. XV, 1845, p. 267.

Nesokia griffithii, Horsfd., Cat. Mamm. East Ind. As. Mus., 1851, p. 145.

Spalacomys indica, Peters, Abhand. der K. Akad. Wissensch. zu Berlin, 1860, p. 143, Taf. IV, fig. 1.

The head short and bluff, much shorter and broader than in *M.* (*N.*) *providens* and *M.* (*N.*) *blythianus;* the muzzle broad and deep, and in these respects it resembles (*N.*) *huttoni.* The eye moderately large and situated about half way between the ear and the end of the muzzle. Ears not large, smaller than in these other two species, rounded, seminude, but clad with minute hairs. Tail variable, but much shorter than in *M.* (*N.*) *providens*, and *M.* (*N*) *blythianus*, seldom exceeding the distance between the vent and the middle of the neck, but shorter than in *M.* (*N.*) *huttoni:* ringed, nearly nude, less clad than in *M.* (*N.*) *providens* and *M.* (*N.*) *blythianus*, with minute hairs. Feet well developed, smaller than in *M.* (*N.*) *huttoni;* claws moderately long; the upper surface of the feet sparsely clad.

The fur is generally soft and moderately long, but not so silky as *M.* (*N.*) *huttoni:* it varies however in this respect and is sometimes somewhat harsh. The pelage, as in the other species, consists of three kinds of hairs, short under-lying fur, and ordinary hairs, intermixed among which, especially on the dorsal and sacral regions, are numerous long black hairs which project a long way beyond the fur, as in *M.* (*N.*) *blythianus*,[*] but not to the same extent. The general colour of the animal on the upper parts is sandy brown or fawn, paler on the sides, and dusky grey with a tinge of yellowish rufous on the under-surface. The muzzle, feet and tail are flesh-coloured, and the ears are of the same colour but somewhat darker.

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* Hodgson described a rat, as *M. plurimammis* from Nepal and the Terai, which, from the description and the proportional length of its tail appears to be an allied species.

Mr. Blanford[†] has pointed out that *M.* (*N.*) *hardwickii* is a much larger animal than *M.* (*N.*) *huttoni*. The measurements of the largest male, *M.* (*N.*) *huttoni*, mentioned by him are as follows, taken from the fresh animal, *viz.* :—

Length of body and head,....................................	7″
Length of tail, ...	4″·6
Length of hind foot, ...	1″·6

whereas the largest male, out of an extensive series of this rat in alcohol, collected by the late Mr. Andrew Anderson at Fatehgarh, gives the following dimensions :

Length of body and head, ...	7″·85
„ of tail,...	4″·60
„ of hind foot, ...	1″·27

Besides differing in size these species would appear also to differ in the relative proportions of the tail and the feet, the latter being somewhat larger in *M.* (*N.*) *huttoni*, than in *M.* (*N.*) *hardwickii*. The *M.* (*N.*) *griffithi* of Horsfield in its proportion agrees with this species. If two female examples of the two species from the same localities are compared, we have similar results, thus—

	M. (*N.*) *huttoni.*	*M.* (*N.*) *hardwickii.*
	♀	♀
Length of body and head, ...	6·50	6″·45
„ of tail, ...	4·55	4″.15
„ of hind foot, ...	1·43	1″·25

I am indebted to Dr. Dobson for having compared the foregoing male specimen from Fatehgarh with the type in the British Museum, with which he pronounces it to agree.

The skulls, however, are remarkably alike and the only differences I can detect are, that the molar teeth of animals by their other characters referable to *M.* (*N.*) *huttoni*, are somewhat larger than those of *M.* (*N.*) *hardwickii*, the anterior palatine foramina of the latter being a little shorter than that of the former, but in both they are much closed and their characters are well shewn in the female skull of this species figured by Prof. Peters. This foramen, however, is subject to a slight variation in the degree to which it is closed. The skulls of both species agree in having an expanded surface to the malar process of the maxillary.

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[*] These piles are not shown in the figure of the species in the Zoology of Persia.

[†] Zool. of Persia, p. 59.

Mr. Andrew Anderson forwarded to the Indian Museum from Fatehgarh specimens agreeing with the example that has been compared with the type of the species and which also conforms to Hodgson's description of *Mus. pyctoris*, the type of which, however, Dr. Dobson informs me, he has not been able to find either in the British Museum or in the India Museum.

This species in the proportion of its tail, in the colour of its pelage, in the flesh-coloured character of its several parts, such as its feet and tail, and in the form of its head so closely approaches the figure of the animal depicted as *Arvicola indica*, that I hesitate only with a meagre doubt to regard it as identical with the animal figured under that name. The only dubiety I have in expressing this opinion arises from the affinity that exists between *M. (N.) hardwickii*, and the burrowing rodent described by Blyth as *M.* (*N.*) *huttoni*.

This species is very prevalent about Fatehgarh in the North-Western Provinces of India, and if *M. griffithi* is correctly identified with it, the species would appear to extend into Afghanistan, to the district about Quettah.

MUS (NESOKIA) HUTTONI.

Mus huttoni, Blyth, Jour. As. Soc. Beng., Vol. XV., 1846, p. 139.

Nesokia indica, Blyth, Jour. As. Soc. Bengal, Vol. XXXII, 1863, p. 328, *partim : id.* Cat. Mamm. As. Soc. Mus., 1863, p. 112, *partim.*

Nesokia huttoni, Blanford, Zool. of Persia, 1876, p. 59, P. VI, fig. 1, et cranium, figs. 1 and 2, p. 60.

Head and general form of the animal the same as in *M.* (*N.*) *hardwickii*, but with larger feet and a somewhat longer tail. Fur also as in that species, but more soft and silky and paler fawn-coloured, the under parts being pale hoary, sometimes tinged with yellowish and ferruginous. The ears are round and about the same dimensions as in *M.* (*N.*) *hardwickii*, and very sparsely clad with minute hairs. The feet sparsely covered with short whitish hairs and the tail also almost nude. The nose and feet are flesh-coloured, but the tail and ears are darker and brownish.

	♂	♀
Length of body and head,*	7″·	6″·7
,, of tail, ...	4″·6	4″·9
,, of hind feet, ...	1″·6	1″·5

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* These measurements are taken from Mr. Blanford's "Persia," and are those of fresh specimens.

The general characters of the skull I have already indicated under *M.* (*N.*) *hardwickii.*

Mr. Blanford states that this field-rat has only 3 pairs of mammæ, but in a female collected by him at Kalagán, Balúchistán, I observe that it has the same number of mammæ as the female of *M.* (*N.*) *hardwickii*, *viz.*, 8, two inguinal pairs, one axillary pair, and one pectoral pair as in that species. Mr. Blanford probably overlooked the axillary mammæ which occur also in *M.* (*N.*) *providens*, and *M.* (*N.*) *blythianus*, and in the ordinary rats, such as *M. decumanus.*

The Indian Museum has received this species from Umballa, where it was obtained by the late Lieut.-Col. Tytler; from Kalagán in Balúchistán from Mr. Blanford, who has also presented examples from Sháhbandar and Khipra, Sind; and from Karachi examples have been received from Mr. J. A. Murray of the Municipal Museum of that town.

Examples have also been quite recently sent to the Indian Museum from Dakka, Afghanistan, by that observant naturalist Dr. Arthur Barclay. He states "that this species occurs in large numbers all about that Fort, which is at a low elevation, being only a little above Peshawar. The soil is loose and very fine, almost like exceedingly fine sand. The holes of this rat do not run deep but ramify horizontally, just below the surface of the ground. It throws out a mound of earth at the exit of the hole. I have never seen these rats out of their dens during the day, but frequently during my evening walk I have watched them throwing out earth. The mouth of the hole is usually kept shut up with earth."

M. (NESOKIA) SCULLYI.

Nesokia scullyi, J. Wood-Mason, Proc. As. Soc. Beng., 1876, p. 80.

Form of body and head the same as in *M.* (*N.*) *hardwickii*, but distinguished from it and from *M.* (*N.*) *huttoni*, to both of which it is closely allied, by its much larger feet, the hinder pair of which in an animal with the body and head 6″·6 long, the hind foot and claws measure 1″·72, whereas in *M.* (*N.*) *hardwickii* and *M.* (*N.*) *huttoni*, in animals of the same dimension the feet measure respectively 1″·26 and 1″·43. The tail is longer than in *M.* (*N.*) *hardwickii*, and in its proportions it more resembles the tail of *M.* (*N.*) *huttoni*. The fur also is longer and more silky than the fur of the two foregoing species, but in this respect it is approached by *M.* (*N.*) *huttoni*. The tail is stated by Mr. Wood-Mason to be without a single hair, but in the type I observe that it is very sparsely covered with hairs, to the tip. The feet are clad with short brown hairs, but to a less extent than in any of the other species.

The fur is a slightly paler fawn than that of *M.* (*N.*) *huttoni*, the long piles being white tipped. The sides are still paler, and the under surface is a pale grey, tinged with yellowish. The whiskers are black, tipped with white. The ears are short, scarcely appearing above the fur, and they are almost nude, but sparsely clad as in the other species. The feet and claws flesh-coloured.

The skull has a broader muzzle than the skull of *M.* (*N.*) *huttoni*, than which it is somewhat larger, exceeding also the size of the skull of *M.* (*N.*) *hardwickii.* It also differs from the skull of *M.* (*N*) *huttoni*, in its greater supraorbital breadth and less expanded zygomatic. It has the expanded malar process of the maxillary as in *M.* (*N.*) *hardwickii* and *M.* (*N.)* *huttoni*, but to less extent than in the latter species, than which the lachrymal foramen is much smaller. Its molar teeth are also larger than in *M.* (*N.*) *huttoni*, and its anterior palatine foramina are more open. Dr. Scully gives the dimensions as follows: total length 11″·8, tail 5″·2, and the weight as 5·6 oz. The irides he states are dark brown.

This species was obtained by Dr. Scully at Sanju in Kashgaria and presented by him to the Indian Museum.

The Indian Museum has received from Muscat, Arabia, a young rat belonging to this sub-genus, of the following dimensions. Length of body and head 3″·35, tail 2″·30, hind foot 0″·93. Its ears are small and rounded, its tail is rather densely clad with short hairs. It is too young to indicate its species, but it is quite distinct from any of the field rats described in this article.

2nd Section.

MUS (NESOKIA) PROVIDENS.

Mus kok, Gray, Mag. Nat. Hist. (Charlesworth's), Vol. I, 1837, p. 585, *partim*, nec *Arvicola indica*, Gray ; *id.* List of Mamm. B. M. 1843, *partim ;* Kelaart, Prod. Faun. Zeyl. 1832, p. 66.

Mus (*Neotoma*) *providens*, Elliot, Mad. Jour. Lit. &c., Vol. X, 1839, p. 209, *partim*, nec *Mus indicus*, Geoff. St. Hil., nec *Arvicola indica*, Gray.

Mus (Nesokia) *indicus*, Blyth, Cat. Mamm. As. Soc. Mus., 1863, p. 112, *partim*, nec *Arvicola indica*, Gray, nec *M. huttoni.*

Nesokia indica, Blyth, Journ. As. Soc. Bengal, Vol. XXXII, 1863, p. 329, *partim*, nec *M. hardwickii*, nec *Mus indicus*, Geoff., St. Hil. ; Jerdon Mammal of Ind. 1867, *partim.*

Mus hardwickii, Kelaart, Prod. Faun. *Zeylanicæ*, 1852, p. 65.

The head short and truncated, with a deep muzzle ; the ears nearly round, the height equalling the distance between the tip of the muzzle and the eye, nearly nude, but sparsely covered with minute hairs. Eye moderately large, occupying about the middle of the interval between the tip of the snout and the ear. Feet well developed. Claws short and stout. The tail nearly equals the length of the trunk and head, and is thus longer than in *M.* (*N.*) *blythianus*, seminude, ringed and with short brown bristly hairs around the margin of the annuli. Whiskers full and long.

The fur is rather harsh and long and consists as in the other species of three kinds, but the long piles are not numerous.

The general colour of the upper parts is brown, paler than in *M.* (*N.*) *blythianus*, with an intermixture of yellowish or fawn-coloured hairs as in that species, producing a varied hue of brown and yellow: the under parts are whitish with a yellowish tinge, and there are no brown or long hairs intermixed. There is a variety occurring in the red soil and which Elliot says is much redder* in colour than the common *Koku* of the dark land. The nose, ears and feet are dark flesh-coloured or brownish, and the feet are covered with short brown hairs. The claws are yellowish. The whiskers are black.

Sir Walter Elliot gives the following measurements of an old male: length of body 7 inches; of tail $6\frac{1}{2}$; total $13\frac{1}{2}$; of head $1\frac{8}{10}$; of ear $\frac{9}{10}$; of fore palm $\frac{4}{10}$; of hind palm $1\frac{1}{4}$; weight 6 oz. 5 drs "†

The skull is considerably smaller than that of *M.* (*N.*) *blythianus*, of the same age, from which it is also distinguished by its more outwardly arched malar process of the maxillary; by its considerably smaller teeth, and long, but less open, anterior palatine foramina. The brain case also is relatively shorter and more globular than that of *M.* (*N.*) *blythianus*. The total lengths of two female skulls of the same age of these species stand in the following relations to each other. *M.* (*N.*) *providens*, 1″·45. *M.* (*N.*) *blythianus*, 1″·67. Molar line in the former 0″·30, in the latter 0″·33. The upper surface of the skull in the fronto-nasal region is less arched in *M.* (*N.*) *providens*, than in *M.* (*N.*) *blythianus*. The incisors are brilliant orange, more so than in *M.* (*N.*) *blythianus*, but this is a variable character.

The external features which distinguish this from the nearly allied *M.* (*N.*) *blythianus* are its smaller size and slightly shorter head and muzzle, and somewhat smaller ears and longer tail, associated with a paler brown fur and fewer long piles.

This animal occurs in southern Western India and also in Ceylon. In the Indian Museum, there is one of Kelaart's specimens of *Mus dubius*, and which he afterwards considered to be *Nesokia hardwickii*, but its skull and features generally are those of this species.

This species produces from 8 to 10‡ at a birth. Elliot relates that this burrowing field-rat is largely eaten by the Wuddurs, or tank-diggers, who also plunder its burrows for the grain that is stored up for its winter consumption, and he mentions that in favourable localities the Wuddurs find the grain in such quantities as to subsist almost entirely upon it, during that season of the year! Sir Walter Elliot has also described the burrows of this species, which apparently closely correspond to those of *M.* (*N.*) *blythianus*, and he states that a variety is said to frequent the banks of nullahs and to take to the water when pursued, but that these differ in no respect from the common kind—an exact parallel to what occurs also with the allied form *M.* (*N.*) *blythianus* found in Bengal.

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* It is a curious circumstance that the pelage of *M.* (*N.*) *blythianus*, becomes quite rufous in alcohol, and that stuffed specimens long exposed to light, change to the same hue, as do also stuffed examples of *M.* (*N.*) *providens*.

† *l. c.*, p. 210.

‡ *l. c.*, p. 210.

MUS (NESOKIA) BLYTHIANUS, n. s.

? *Arvicola bengalensis*, Gray and Hardw., Ill. Ind. Zool., Vol. II, 1833-34, pl. 21, not described.

Mus (Nesokia) indicus, Blyth, Cat. Mamm. As. Soc. Mus, 1863, p. 112 *partim*, nec *M. indicus*, Geoffroy St. Hil.

Nesokia indica, Blyth, Journ. As. Soc. Beng., Vol. XXXII, 1863, p. 329, *partim*, nec *Mus indicus*, Geoffroy St. Hil.; Jerdon, Mamm. Ind. 1867 p. 187, *partim*, nec *M. indicus*, Geoffroy St. Hil.

Head moderately large, but the muzzle broad and deep compared with *Mus decumanus*. Ears rounded; about one half the length of the interval between their base anteriorly and the tip of the snout nearly nude, but sparsely covered with minute hairs. Eye moderately large, placed a little nearer the ear than towards the tip of the snout. Feet well developed, moderately large. Claws short and stout. The length of the tail somewhat variable, but rarely exceeding the length of the trunk, exclusive of the head. It is ringed and sparsely covered with short bristly hairs at the margins of the rings.

The fur is rather coarse and the piles are profusely intermixed among the pelage and project a long way beyond it. These long hairs are most numerous on the lumbar and sacral regions.

The general colour of the animal is dark brown with fleshy-coloured nose, ears and feet, the under-surface having a somewhat greyish tint approaching to hoary. Intermixed among the generally brown hairs of the upper parts, are numerous yellowish hairs producing a speckled appearance, and these yellow hairs give rise to a somewhat rufous tint in the brown colour. The under-surface is without any intermixture of brown and yellow hairs. The ears and upper surface of the feet and the tail are clad with short brown hairs. The whiskers are black.

Measurements in the flesh, of male and female.

	♂	♀
Length of body and head,........................	8″·20	6″·05
„ „ tail, ...	6″·45	5″·55
Total length, ...	14″·65	11″·60
Length of hind foot, ...	1″.30	1″·30
Height of ear,.......................................	0″·83	0″·75
Breadth of ear, ...	0″·75	0″·65

The females are distinguished by the presence of 8 pairs of mammary teats. Two in the inguinal region, four on the sides, one pair in the axilla and one pectoral pair.

The skull is distinguished from the skull of the nearly allied form *M. (N.) providens* by the characters already stated, and from the skull of *M. hardwickii* it differs in its considerably narrower incisors and smaller and more irregularly laminated molars, and by its long and open anterior palatine foramina. It is also a more arched skull. The incisor teeth are orange, occasionally brilliantly so, but generally white towards their tips, whilst in some these teeth are nearly white in both sexes, but the teeth of the males are usually the most coloured.

The nasals vary considerably in length and breadth. Compared with the skulls of ordinary mice, shortness of muzzle is one of its most distinguishing features, associated with expansion of the zygomata and general rotundity. The skull of the male is always considerably larger than that of the female. Among males found among the native huts, I have observed two types of skull, one larger than the typical form, but the animals in other respects were identical with other males conforming to the ordinary type of skull. I have never observed these more elongated skulls in females, but if they do occur I would be disposed to attribute the variation to inter-breeding with *Mus decumanus*.

The adult rat, in its external appearance, has a strong resemblance to *M. decumanus*, when the depth of its muzzle and longer tail are overlooked, and a superficial observer at first sight would be disposed to regard them as one and the same species.

It is distinguished from *M. (N.) hardwickii*, by its much longer tail, by its coarser and much darker pelage, narrower incisors and larger ears, and these features and its much smaller feet distinguish it from *M. (N.) scullyi*.

It is a larger animal than *M. (N.) providens*, than which it has somewhat larger ears, a larger head, and broader incisors.

The Indian Museum possesses examples of this species from Gházipur in the North-West of India, from Dacca, Cachar and Midnapore, and numerous specimens from Calcutta and its neighbourhood.

In Cachar specimens, the colour is somewhat darker.

This rat is very generally distributed over Lower Bengal, and from its abundance it becomes a nuisance in gardens, owing to the tortuous character of its burrows, and from the circumstance that they are generally only a few inches below ground, unless the animal happens to burrow on the bank of a tank when the burrow usually runs horizontally inwards. A burrow consists of a great number of short passages which run a short way and then stop, but I have been unable to detect that they are generally constructed on one plan. There is, of course, a continuous but tortuous principal passage from which the offshoots are given off, and the termination of the former, or it may be the end of one of the short passages, may be enlarged and contain a nest of leaves and grass. Other burrows are much simpler, consisting of only a few passages with one principal passage running right inwards for a long way, and these are generally constructed on the banks of tanks. From a nest such as that described I have removed as many as 10 young rats. Like *M.* (*N.*) *providens,* it is of a fierce disposition and utters a peculiar aspirant sound, grinding and rather knocking its teeth together at the same time, and erecting all its fur, more especially the long piles, and contracting its ears which, like the ears of rats generally, are capable of a folded contraction, about the middle of the conch.

I have already mentioned its aquatic habit and that of storing grain.

The Indian Museum, some years ago, received from Moulmein, through the late Captain Hood, a nearly albino adolescent female *Nesokia* closely allied to this species and to *M. (N.) providens*, but as it is immature, and abnormal in colour, I hesitate to name it specifically. The following are its measurements:

Length of body and head, ...	6″·70
„ of tail, ...	5″·26
Total length, ...	11″·96
Length of hind foot,..	1″·32
Height of ear, ...	0″·75

The skull has the ordinary characters of this section of the Sub-genus, and manifests some affinities to *M.* (*N.*) *providens*, more especially in its anterior palatine foramina, which are narrower than in *M.* (*N.*) *blythianus*.

Hodgson has described a rat which is closely allied to this species, *viz.*, *M.* (*N.*) *plurimammis.*

Mus (Nesokia) barclayanus, n. s.

Dr. Arthur Barclay of the Bengal Medical Service, obtained at Gúna, Central India, an adult male field rat which appeared at first sight to be a new generic type, judging from its external appearance only. Whilst it had the general form of *Nesokia* there was this remarkable feature that its ears were nude and only projecting a very short way above the fur, while a broad white band ran from above the nose, through the eye, to the ear. I had the animal figured and afterwards killed, and on examining the skull there could be no doubt regarding the animal's affinities, and that it was closely allied to *Mus (Nesokia) blythianus*, having the same narrow incisors, compared with *M.* (*N.*) *hardwickii*, and the same small molars, with wide anterior palatine foramina.

The ears were nearly symmetrical on either side and, as already stated projected only a little above the fur. It seemed to me, however, that their short character was due to their having been artificially cut, as the margin of each ear was rounded and unhaired. I was therefore disposed to conclude that this rat must have been once in confinement, probably on account of the curious sport of a white band from the nose through the eye, and that either to mark the animal so that it could always be recognised, or perhaps with the object of enhancing its value to the uninitiated, its ears had been cut. There could be no doubt but that it was a *Nesokia* allied to, but probably distinct from, *Mus* (*N.*) *blythianus.*

I was so convinced of this that I sent to the North-West for more specimens of these field rats, and to Mr. Whitwell of the Opium Department, Gházipur, I am indebted for a female field rat which appears to be a normal example of a species which was first made known by the sport which I have described.

The following is a description of this species:

Muzzle short and bluff, less so than in *M.* (*N.*) *hardwickii*, and slightly shorter than in *M.* (*N.*) *blythianus.* Ears moderately large and rounded. Forehead slightly arched. Tail exceeding the length of the trunk, but not equalling the length of the combined body and head: ringed and sparsely clad. Hind foot well developed. Piles moderately long. Fur not very soft, much coarser than in *M.* (*N.*) *huttoni.* General colour of upper parts brown or brownish, tending to silvery grey on the under surface. Feet and muzzle flesh-coloured; hair brownish. Tail nearly black. Claws horny white.

Dimensions of male and female.

	♂	♀
Length of body and head, ...	8″·70	7″.75
„ of tail, ...	7″·20	7″·00
„ of hind foot, ...	1″·39	1″·33

The skull is considerably larger than that of *Mus* (*N.*) *blythianus*, relatively longer and more arched. There is not, however, very great difference in size between the teeth of this form and that of *M.* (*N.*) *blythianus*, and the anterior palatine foramina are much the same in both. The nasals are considerably relatively broader and larger than those of *Mus* (*N.*)

blythianus, but these bones appear to be subject to considerable variation in this group, and, in the female skull, they are much narrower than in the skull of the male.

In Sind, there is a field rat which corresponds in its general character to this species. The skull of a female from Khípra, Thar and Párkar District, Sind, has all the characters of the female from Gházipur with exactly similar nasals.

A very closely allied, if not identical rat to this, is found at Srinagar, Kashmir, and of which the Indian Museum has one example collected by Dr. Stoliczka.

Its skull exactly agrees with the skull of the male (see figure), except that its nasals are a little narrower. This Kashmir rat is a dark sandy brown above, with long black piles, especially on the lower portion of the back; the under surface of the animal being yellowish with an intermixture of dusky. The fur is coarse, resembling that of this species, of which the Kashmir rat is probably a local race.

This rat appears also to occur in the Purneah District, and in the Indian Museum there is a skull of a rat, marked Cachár, seemingly closely allied to this form.

3*rd Section*

Mus (Nesokia) elliotanus, n. s.

Head short and deep; muzzle deep and broad; eye half way between ear and nose, moderately large; ears not large, rounded sparsely covered with short hairs. Feet large and well developed with strong claws and sparsely clad. Tail sparsely covered with short bristles on the margins of the annuli, and nearly equalling the length of the body and head.

Pelage coarse, with moderately long piles, most numerous on the back and over the rump. Vibrissæ moderately long.

General colour above, brown with intermixed yellowish or pale brown hairs, producing much the same colour as in *M.* (*N.*) *blythianus*, paler on the sides and passing into greyish on the under parts. Nose and feet flesh-coloured. Ears dark brown, tail blackish.

Measurements of 4 specimens.

	Calcutta. ♂	Purneah. ♂	Calcutta. ♀ juv.	Purneah. ♀ juv.
Length of body and head,...	10″·50	9″·85	8″·25	6″·95
„ of tail, ...	5″·80*	9″·70	7″·40	6″·90
„ of hind foot, ...	2″·28	2″·28	2″·04	1″·83
Height of ear, ...	1″·12	1″·08	0″·95	1″·03

The skull of this species approaches in size the dimensions of the skull of such rats as *M.* (*N.*) *giganteus*, but in form it resembles the skull of

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* Imperfect.

M. (*N.*) *blythianus* more than that of the former, being less elongated and with a shorter muzzle, with less breadth between the lachrymal foramina. The teeth have the same characters as in *M.* (*N.*) *blythianus*, but, of course, are very much larger. The nasals are moderately short and very different from the broad nasals of *M.* (*N.*) *giganteus*.

The total length of the skull of the largest male is 2·20 from the upper border of the foramen magnum to the end of the premaxillaries, with a maximum breadth of 1·27 across the zygomatic.

Mr. S. E. Peal has presented to the Indian Museum from Sibságar, Assam, a rat distinctly referable to this species, and I am indebted to Mr. W. T. Blanford for the opportunity to examine another example of this species from the Khási Hills.

In all of these skulls, the female as well as the male, the incisors are bright orange, but in the female somewhat paler, due to her youth or, it may be, sex, and with white tips as in the male Assam skull.

I obtained this rat first at Purneah and afterwards two specimens at Calcutta. The adult male of these two I obtained from a native who asserted that he found it in a palm tree, which I discredit. It is evidently a burrowing rat closely allied to *M.* (*N.*) *blythianus*. It would appear to be very rare about Calcutta, for I have not succeeded in obtaining more than two specimens, notwithstanding that I have made special efforts to obtain others. In all probability, the rats mentioned by Hardwicke as Calcutta bandicoots were large examples of *Mus decumanus*, which occasionally attains to a great size.

Blyth, in his Memoir on the Rats and Mice of India, remarked that *Nesokia indica (=Mus blythianus)* had not been seen from the eastward of the Bay of Bengal, though it was likely enough to occur in the dry climate of the region of the Upper Irawadi. Mr. Theobald in 1866*, in confirmation of this supposition of Blyth's, recorded the occurrence at Tonghoo, on the Sittang, of a rat which he referred to this sub-genus. The dimensions indicate an animal of about the same size as *M.* (*N.*) *elliotanus*, but distinguished from it at once by the different proportions of its tail and trunk. It is in all probability a new species.

MUS (NESOKIA) GIGANTEUS.

Mus giganteus, Hardwicke, Trans. Journ. Linn. Soc., Vol. VII, 1804, p. 306, Pl. 18; Desm. Mamm. 1822, p. 298; Brantz, Muizen, 1827, p. 101; Gray, Proc. Zoo. Soc. 1832, p. 40; Kelaart, Faunæ Zeylanicæ, 1852, p. 58.

Mus (*Neotoma*) *giganteus*, Elliot, Madr. Journ. Lit. and Sc., Vol. X, 1839, p. 209.

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* Proc. As. Soc. Beng. p. 239.

Mus bandicota, Blyth, Cat. Mamm. As. Soc. Mus., 1863, p. 112; *id.* Journ. As. Soc. Bengal, Vol. XXXII, 1863, p. 333.

Pandi Koku, Telegu = Pig-rat, according to Elliot, *l. c.*, p. 209.

Nose somewhat pointed; muzzle moderately long and rather deep; eye considerably nearer to the ear than to the nose, moderately large. Ears somewhat large and rounded, nearly nude, but sparsely clad with short brown hairs. Tail broadly ringed, sparsely clad with short hairs and nearly equalling the length of the body and head. Feet well developed, sparsely clad on their upper surfaces with short hairs; claws not strong. Vibrissæ long, some of those of the moustache passing behind the ear.

Pelage coarse, consisting of three kinds of hairs, *viz.*, the underlying fur, the bristly hairs of the general pelage and the long coarse piles which are intermixed in great profusion among the fur of the back. These long piles are especially abundant on the lumbar and dorsal regions where they are very long, and being so numerous hide the general pelage lying below them and project out a long way beyond it. The piles are almost entirely absent from the sides of the animal and from the head and neck, but, beyond the latter region they rapidly increase in numbers and length. In the living animal, these piles are always as a rule erect.

The general colour of the animal is earthy brown with intermixed yellow hairs, paler on the sides, where the yellowish or grey hairs are more numerous, owing to the absence of the piles. The piles are so numerous on the back that that region is uniform dark brown, and this colour is prolonged along the back to the head. The under surface is dusky brown with a greyish tint. The limbs are brownish, and the nose, inside of the ear and the feet are flesh-coloured, the upper surface of the latter being sparsely covered with dark brown hairs. The tail is black.

This animal attains to a great size; the type having measured 13·25 inches in the length of its body and head, with a tail 13 inches long; but adult males are even larger than this.

The skull of this rat is much more elongated than the skull of *M.* (*N.*) *providens*, but it, as already stated, belongs to the same group, but is, of course, immensely larger, measuring 2″·66 in length by 1″·35 in maximum breadth across the zygomatic. It differs from the skull of the allied species from Lower Bengal and Assam in its slightly more elongated muzzle and very much larger nasals. The female has 12 mammæ.

This species occurs in great numbers in the district around Gúna and, like its congener *M.* (*N.*) *blythianus*, it has the reputation of being a water rat. In the Manbhúm District it is not uncommon, but two specimens in the Indian Museum are much greyer than those from Bhádrachellum, south of the Godávari, presented by Mr. W. T. Blanford, and which nearly resemble the bandicoot of Ceylon. The Manbhúm rats have many greyish piles interspersed among the dark brown hairs, but this seems to be only a local variation of no importance. Their skulls agree with the skulls of the bandicoots from Gúna, for which I am indebted to Dr. A. Barclay, and are not separable specifically from them. Although these Gúna rats and also the bandicoots from the south of the Godávari are the exact counterparts in external appearance of the Ceylon rats, the skulls of the latter have remarkably different nasals from the rats of Gúna and Manbhúm, being much narrower and more posteriorly pointed, and moreover the muzzle of the skull is narrower and not so long. Allowance, however, must be made for variation, especially in insular examples of a species, and I am, therefore, disposed to regard the foregoing differences observable in the species of the Ceylon bandicoots in this light.

Description of Plates.

Plate XIII, *Mus (N.) blythianus : a*, upper view of skull of a ♂ ; nat. size : *b*, under view of same skull : *c*, side view of same skull : *d*, teeth of right upper jaw and teeth of right lower jaw, enlarged

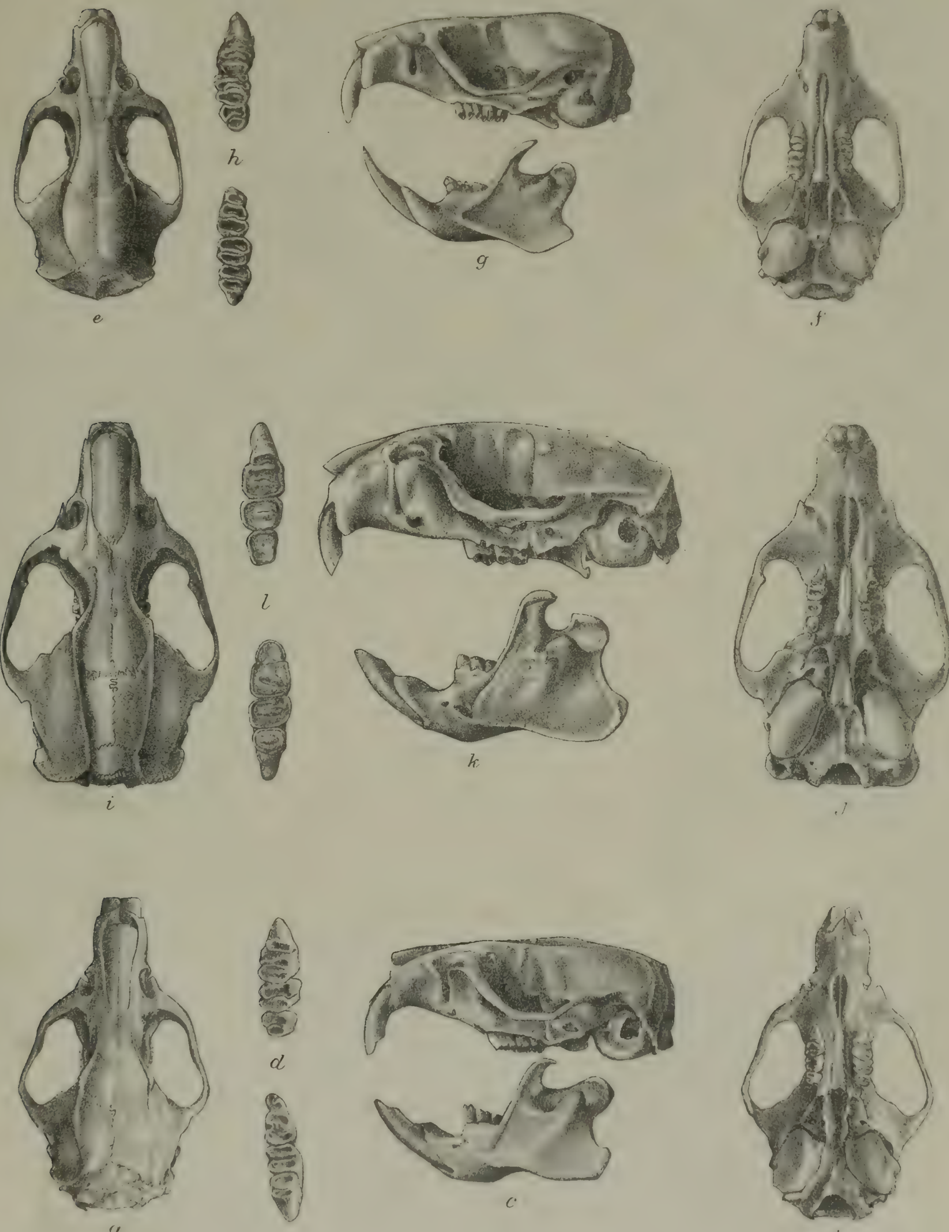
Mus (N.) providens : e, upper view of skull of *M. N. providens*, nat. size : *f*, under view of same skull : *g*, side view of same skull : *h*, teeth of right upper and lower jaws, enlarged.

Mus (N.) barclayanus : i, upper view of skull : *j*, under view of skull : *k*, side view of skull : *l*, teeth of right upper and lower jaws, enlarged.

Plate XIV, *Mus (N.) giganteus : a*, upper view of skull : *b*, under view of skull : *c*, side view of skull : *d*, 1, teeth of right upper jaw, enlarged : *d*, 2, teeth of right lower jaw, enlarged.

Mus (N.) elliotanus : e, upper view of skull : *f*, under view of skull : *g*, side view of skull : *h*, right upper and lower teeth, enlarged.

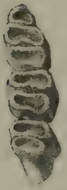
J. ANDERSON. Journ: Asiat: Soc: Bengal. Vol. XLVII. Pt: II. 1878. PLATE. XIII.



Kaliludin Amed. del.

S. Sedgfield. Lith. Calcutta

J. ANDERSON. Journ: Asiat: Soc: Bengal. Vol. XLVII Pt. II. 1878. PLATE XIV.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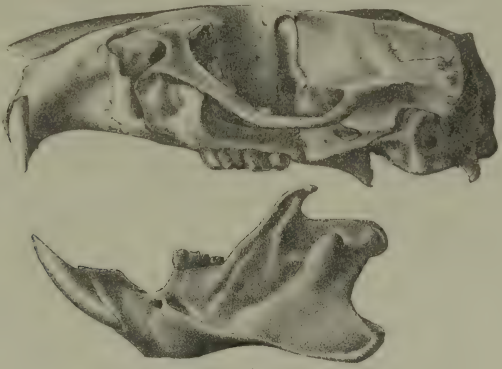
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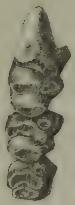
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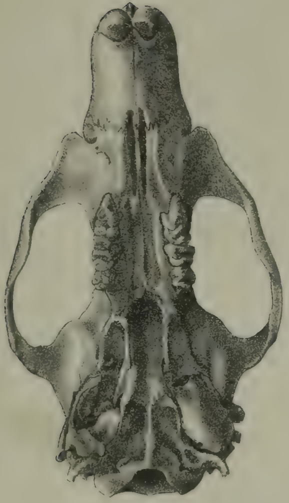
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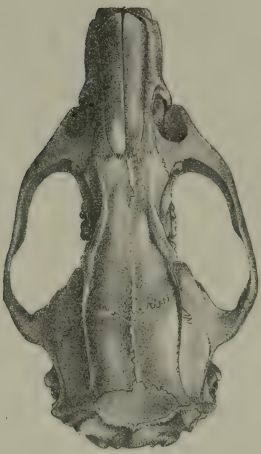
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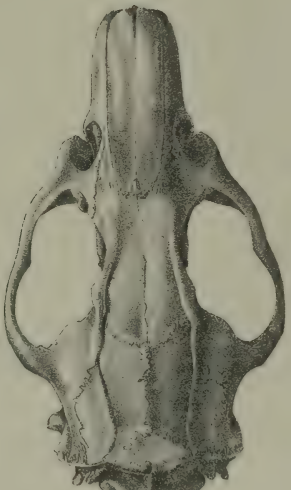
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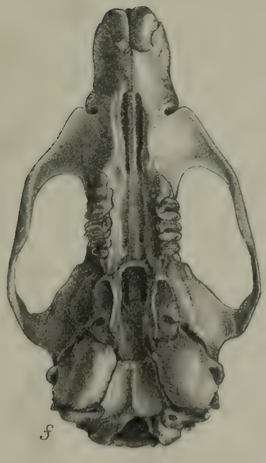
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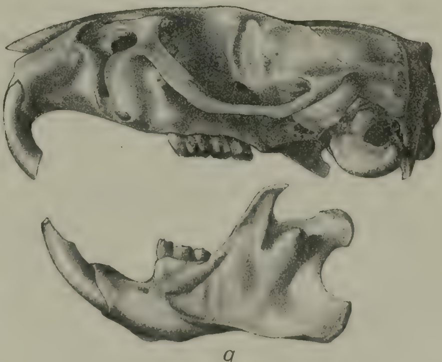
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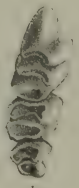
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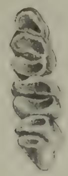

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